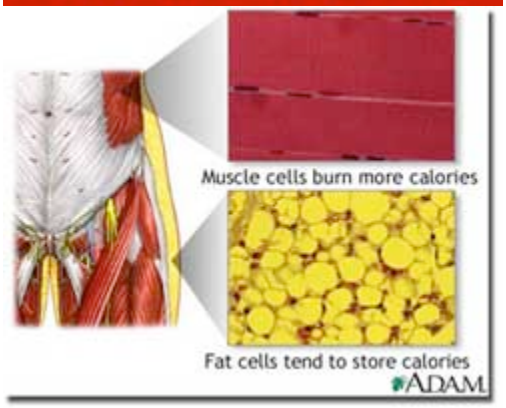
LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: May 5-May 9, 2008.

Living large

nature news



The battle of the bulge may never be beaten, according to new research on fat cells. A new study by Lawrence Livermore National Laboratory scientist Bruce Buchholz – along with colleagues from the Karolinska Institute, Humboldt University Berlin, Foundation of Research and Technology and Stockholm University -- has found that while 10 percent of the body's fat cells die each year, that same amount of new ones are produced annually to replace them.

The research appears in *Nature* magazine. To read more, see https://newsline.llnl.gov/articles/2008/may/05.09.08_fatCells.php.

From military defense to cancer offense

Physicist George Caporaso (standing) and engineer Mark Rhodes work with a component of the compact proton-beam accelerator they developed in partnership with UC Davis Cancer Center.

LLNL's expertise in national security and military technology, combined with UC Davis medical research, is producing advances in the fight against cancer, from proton radiation therapy to improvement in diagnosis and treatment.

UC Davis Medicine takes an extensive look at how technology once used to defend the country is now defending against the ravages of cancer.

To read more, see
https://publicaffairs.llnl.gov/news/llnl_reports/UC_Davis_Article1.pdf

NIF lighting the way for future fusion experimentation

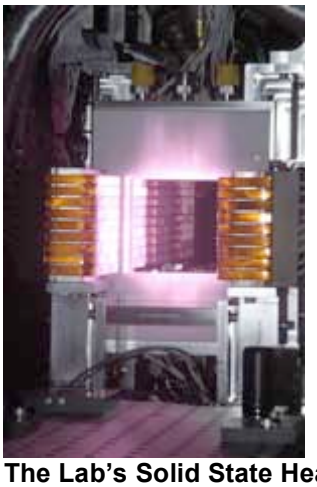
THE SUNDAY TIMES

A nuclear fusion laboratory designed to recreate the temperatures and pressures inside the sun could be built in the United Kingdom, if British scientists have their way. That laser, Called HiPER, would be based largely on the work at LLNL's National Ignition Facility.

The United Kingdom's *Sunday Times* recently spoke with NIF Director Ed Moses about LLNL's quest to achieve fusion in a laboratory setting.

For more, see
http://www.timesonline.co.uk/tol/news/uk/science/article3868099.ece

Solid state lasers pump up the power



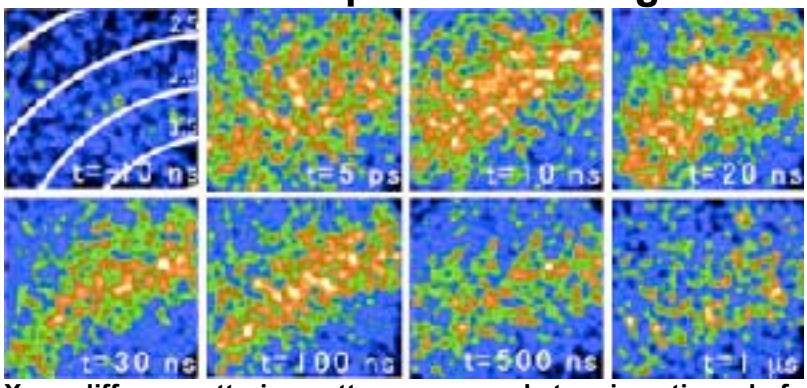
The Lab's Solid State Heat Capacity Laser

The next frontier for high-power, solid-state lasers could be used on the battlefield. The military envisions mounting these lasers in a truck or tracked vehicle to defend against rockets, artillery and mortars – or RAM, in military-speak.

The current record for solid state laser power is held by Lawrence Livermore's Solid State Heat Capacity Laser.

Laser Focus World takes a look at the potential for this laser along with other solid state lasers, in its May edition. For more, see http://www.laserfocusworld.com/display_article/292398/12/none/none/Feat/Photonic-Frontiers:-laser-weapons---Pumping-up-the-power

Faster than the speed of melting



X-ray diffuse scattering pattern measured at various times before and after laser excitation.

The process of melting has long been of interest to scientists. In the case of indium antimonide (InSb), a semiconductor often used to study such processes, the first steps in melting take a few hundred femtoseconds, a quadrillionth of a

second.

Until recently, no one knew what happened after the initial stages of a phase transition. An international collaboration of scientists, including LLNL researcher Art Nelson, has uncovered new clues about the first instants of this process, published in *Physical Review Letters*. The findings could lead to improved materials processing techniques, such as electronics manufacturing.

For more, see http://www-ssrl.slac.stanford.edu/research/highlights_archive/femtosecond_2008.html

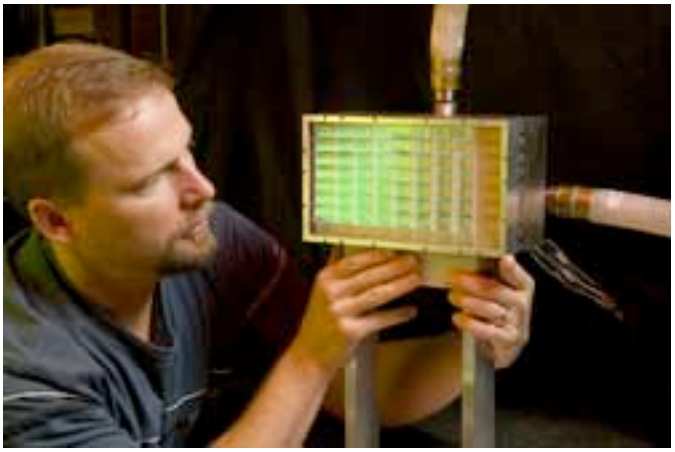
Edward Teller Centennial Symposium

As part of his centennial observance, Lawrence Livermore National Laboratory is hosting a full-day symposium on the scientific legacy of the late Dr. Edward Teller. The event will take place on May 28 at the new Bankhead Theatre in downtown Livermore, Calif. The format will consist of presentations and historical reflections on Teller's scientific career, followed by specialized lectures from distinguished speakers in each field of science, technology and education where he made seminal contributions.

The symposium is sponsored by the Lawrence Livermore National Laboratory, the University of California, the Hertz Foundation, and the Hoover Institution of Stanford University.

For more information, see https://tellercentennial.llnl.gov/

Developing diodes for tomorrow’s technology



Kurt Cutter, the lead technician for the Solid State Heat Capacity Laser at LLNL, shows off a high-powered diode array. There are 560 individual diode bars that make up this array – seven rows of 80 diode bars per row. Each diode bar produces 100 watts of power, for a total of 56,000 watts. The array was designed by the Laboratory's Ray Beach and Barry Freitas and has been licensed for commercial production. The array is used to pump the transparent ceramic laser gain media used in the Solid State Heat Capacity Laser.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail labreport@llnl.gov.

The Livermore Report archive, including today's issue, is available at: https://publicaffairs.llnl.gov/news/lab_report/2008index.html